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ABSTRACT

The aim of this study was to develop tools for screening and assessment of socio-medical effects of alcohol use which are simple and inexpensive enough to be used in any primary health care setting. A test protocol was prepared by a group of investigators from Australia, Bulgaria, Kenya, Mexico, Norway, and the United States. Based on a number of assessment procedures for negative consequences of alcohol use and current knowledge, information was collected from subjects in the following eight areas: (1) demographic data; (2) subjective complaints associated with excessive alcohol use; (3) clinical examination with emphasis on excessive alcohol use; (4) level of consumption of alcohol and prescribed drugs; (5) alcohol dependence syndrome; (6) social consequences of drinking; (7) biochemical tests; and (8) patient self-evaluation. At hospitals, emergency units, and primary care facilities, health workers interviewed at least 180 male and female patients between the ages of 18 and 55 who were regular drinkers. A relatively large proportion of patients were infrequent drinkers. Variations among groups were considerable and dispersion within groups was large. A few carefully chosen items were shown to predict heavy consumption. The optimal screening instrument is not yet finished. However, this study suggests that simple questions and procedures pointing to potential harmful alcohol use can easily be included in medical routines. (Seven tables and nine graphs depicting test results are included. Fourteen references conclude the document.) (ABL)

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CORRELATES OF HARMFUL ALCOHOL CONSUMPTION IN SIX COUNTRIES: DEVELOPMENT OF AN INTERNATIONAL SCREENING AND ASSESSMENT PROCEDURE

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CORRELATES OF HARMFUL ALCOHOL CONSUMPTION IN SIX COUNTRIES: DEVELOPMENT OF AN INTERNATIONAL SCREENING AND ASSESSMENT PROCEDURE

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1. Introduction

As a consequence of the gradual shift towards public health perspectives of alcohol use, the World Health Organization and others have proposed and initiated a number of different projects. The aims of these have been to review or develop procedures for assessment of ethanol intake and injury as well as to test new intervention strategies (Murray 1977, Moser 1980, Skinner et al. 1981, Kristenson et al. 1983, Rootman et al. 1984).

The aim of the present study was to develop tools for screening and assessment of socio-medical effects of alcohol use, simple and inexpensive enough to be used in any primary health care setting. The study has been organized through the WHO-Headquarter, Geneva, with a Norwegian group of investigators as the operating unit.

The literature offers a vast number of different assessment and screening procedures, medical as well as psychological. However, two major shortcomings frequently encountered are the cultural specificity of the different instruments, and "alcoholism" or "alcohol dependence" as the dominating areas of interest.

The idea of the present study was to compare different known methods used for the evaluation of alcohol-related problems. We have so far chosen the self reported level of alcohol consumption and the frequency of intoxication as our independent variables. Accordingly all scores obtained by various screening procedures have been compared to our independent variables. The different procedures have been calibrated by looking at correlations between different levels of alcohol consumption (or frequency of intoxication) and the different scales or items to find procedures that are more or less alcohol-specific in a variety of different cultural settings. The aim was to establish a simple screening instrument that could enable health workers to discover milder degrees of alcohol-related problems than the traditional alcoholism, thereby making the implementation of secondary preventive measures possible.

The study also has a second phase, not yet terminated, where the aim is to evaluate different modes of minimal intervention in high risk groups.

2. Study design and data analysis

A test protocol (schedule) was prepared by a group of investigators from the six participating countries: Australia, Bulgaria, Kenya, Mexico, Norway and USA. Based on a number of procedures for assessing negative consequences of alcohol use, MAST (Selzer 1971), CAGE (Ewing 1984), MALT (Feuerlein et al. 1977), SADQ (Stockwell et al. 1979) and the LeGo Grid (LeGo 1976), as well as present knowledge with regard to clinical and biochemical consequences of ethanol intake (Holt et al. 1981, Paton et al. 1981, Papoz et al. 1981), information from the following areas was collected for each subject:

1. Demographic and other background data (16 questions)
2. Subjective complaints often associated with excessive alcohol use (29 questions)
3. Clinical examination with particular emphasis on some signs and symptoms frequently related to excessive alcohol use (19 items)
4. Level of consumption of alcohol and prescribed drugs
5. Alcohol Dependence Syndrome (14 questions)
6. Social consequences of drinking (12 questions)
7. Biochemical tests (6 different blood tests)
8. Patient's self evaluation (3 questions)

Most items were scored by a frequency scale (never during last year, less than monthly, monthly, weekly, daily or almost daily), or on a "magnitude" scale (not present, mild, moderate, severe).

A doctor (or another kind of health worker) interviewed and examined a number of patients attending general hospitals, emergency units and primary health care, each country trying to establish a quota sample of at least 180 patients of both sexes in the age-bracket 18 to 55, who all used alcohol more or less regularly ("drinking patients", DP). In addition, a group of established "heavy drinkers" (HD) was to be included from each centre, and if possible, a group of abstainers (AB). The idea was that these two extreme groups could facilitate the "calibration" of the instruments to be developed.

The questions on level of alcohol consumption were detailed and comprehensive, since it was crucial for the study to be able to correlate other findings to different levels of consumption. In addition to a traditional quantity/frequency set of questions, a new method was utilized, based on the respondents' ability to describe what for them was a low, medium and high level of daily

drinking, and to indicate how often during the last month and a typical month they had been drinking on these different levels.

A number of preliminary analyses testing the internal reliability and consistency of the clusters were carried out for males and females separately, to control for possible major gender differences, and for drinking patients (DP) as well as for all drinkers (DP+HD), to get an impression of the alcohol-specificity of the different clusters. Item/total correlations were tested with Pearson or biserial correlations, and the intra-class correlations by Cronbach's alpha,. Items that showed poor or negative item/total correlations, or that had only negative scores in the patient groups, were removed from the clusters.

For the purpose of constructing a screening instrument, the following clusters were singeled out as potentially useful (item no. from the form used in parenthesis):

Alcohol non-specific (alcohol not mentioned):

Subjective complaints (17, box 42-55.and 60-64)
History of trauma (17, box 68-70)
Clinical examination (21-28,30)

Alcohol specific (alcohol mentioned in questions):

Negative alcohol reactions (70,73,74)
Positive alcohol reactions (71,72)
Alcohol problems last year (75bcd, 76bde, 77bcd, 78bcd, 79 bc)
Alcohol problems ever (75a, 76a, 77a, 78a, 79a)
Alcohol dependence syndrome (56-69)

In addition the separate items GGT (gamma glutamyl transpeptidase) and Systolic Blood Pressure were included.

The correlations between alcohol intake (quantity and frequency) and each item as well as the total scale score were then calculated, to find how items or scales could predict a heavy or frequent consumption.

All these analyses were performed on the DP group only, in order not to artificially inflate the dispersion in the sample.

3. Results

The age and sex distribution among the subjects is given in Table 1. The table also indicates the main groups in relation to alcohol consumption. It turned out that a relatively large proportion of the patients were very infrequent drinkers. This made it necessary to include an additional group: infrequent drinkers (ID), characterized by intake less than three times per year.

Table 2 shows the level of consumption and frequency of intoxication among drinking patients and heavy drinkers in the various countries. Variation among centers is considerable, and the dispersion in each group is relatively large.

The alphas of the major scales, as well as the correlations between scale scores and alcohol consumption (typical month) and frequency of intoxication (drinking 56 g of ethanol or more on one occasion) are given in Table 3. All countries but Bulgaria and Kenya have significant correlations between alcohol intake and some scales where the items are not alcohol-specific (subjective complaints, clinical examination or trauma history), suggesting the possibility of including such items in a screening procedure.

Fig. 1 shows how the average scores on some of the scales vary with different levels of alcohol consumption. Here all drinkers are included (DP + HD), in order to get sizeable groups on all levels. Although there are relatively large differences between countries, the general tendency is clear: starting on a self-reported average consumption between 10 and 30 grams of ethanol daily, effect is clearly detectable, and it becomes more pronounced with increasing consumption.

Fig. 2 demonstrates the gender differences among all drinkers in the total sample. The F-values show significant differences between grouped averages on different levels. The difference between females and males has also been tested on each level (Mann-Whitney test), and it is generally not significant. It is interesting to observe, however, that women tend to score higher than men on some of the scales (subjective complaints, clinical examination and alcohol dependence).

4. Approaching a screening instrument

In some epidemiological studies on alcohol induced organ damage, a consumption level of 40 grams of ethanol per day has turned up as a critical level with regard to changes in liver and brain, and probably other organs (Pequignot et al. 1978, Holt et al. 1981).

Figs. 1 and 2 indicate that an average alcohol consumption level of e.g. 40 g per day or more may be predicted utilizing the different scales. Table 4 lists the items that proved to have the best sensitivity, specificity and predictive value of positive results when average daily consumption over 40 grams of ethanol was used as criterium. On the subjective complaints and the dependency items, that are scored by frequency (never, less than monthly, monthly, weekly, daily or almost daily), "never" and "less than monthly" are recorded as negative answers, and on clinical examination items, where the options are "none", "mild", "moderate" and "severe", we have cut between "none" and "mild".

The cut in gamma glutamyl transpeptidase is made in the upper normal range at 50 units Norwegian standard. (Laboratory data from the different centres were converted into Norwegian standard based on results from analyses of two circulated specially prepared test samples). Systolic blood pressure was considered elevated above 130 mm Hg.

After grouping the items in alcohol non-specific and alcohol specific, a stepwise multiple regression against alcohol consumption was performed, yielding the best items for each country and their cumulative contribution to the total correlation. The results of this analysis are given in Table 5.

From a clinical point of view it seems practical to have a screening instrument that contains two steps: one general, clinical component where alcohol is not focused, and one alcohol-specific component (with better specificity), to be used on selected groups. It is also feasable to have a variety of items, to cover different effects (eg. acute and chronic).It is not practical, however, to include all scale items in a screening procedure supposed to be short and simple.

One rough test of the discriminative power of the instruments is to apply them on the samples. If we include all items in the two parts, and score 0 or 1 according to the criteria already mentioned, the non alcohol specific part has a maximum score of 9, and the alcohol specific part 7. If we cut the first part between 4 and 5, and the second between 3 and 4, we can calculate the predictive value of positive results of the instruments, after having chosen a risk criterium. Using over 40 grams ethanol daily consumption average, we find the results given in Table 6. Since predictive value depends on the prevalence of the condition to be investigated, the prevalence of drinking more than 40 grams per day average is given for the different countries. The table then demonstrates how the non-specific and the specific instruments respectively can predict an average consumption of more than 40 grams ethanol per day.

Finally, a similar analysis was done where the best items (table 5) from each country are applied; first one non-specific and one specific, then two of each. The items and values are given in Table 7. We see that very few carefully chosen items can predict heavy consumption quite well.

5. Conclusions

Some analyses remain to be done (e.g. analysis of variance), and some already done are not included in this paper (e.g. principal component analyses). The optimal screening instrument therefore is still not finished. However, in our opinion the glimpse into the extensive sets of international data presented in this paper should convince the general health worker that simple questions and procedures pointing to potential harmful alcohol use easily can be included in medical routines on very

basic levels.

Like in all similar studies, a reservation has to be made with regard to the validity of the consumption data. However, there is a clear relationship between self-reported consumption and subjective as well as objective clinical findings. Since the majority of the patients are not individuals suspected of having alcohol-related problems, and therefore should not deliberately be under-reporting, the case for self-reported alcohol consumption as a good measure of possible negative effects of alcohol use in regular patient groups, in our opinion is strenghtened.

However, the predictive value of the scales and items with regard to alcohol induced injury can only be established through further, prospective research. It is our hope that the present findings might initiate studies in different cultural settings where the use of alcohol is a potential hazard to health and well being, and that the validity of the proposed instruments can be tested properly.

TABLE 1

Characteristics of the samples (percent):

	AUS		BUL		KEN		MEX		NOR		USA		
age	M	F	M	F	M	F	M	F	M	F	M	F	(n)
18-30	37	40	26	25	38	48	37	42	27	36	36	34	(658)
31-40	23	26	31	31	31	32	37	29	35	35	32	34	(606)
41-55	40	34	42	42	30	20	26	29	38	29	32	32	(638)
out	0	0	1	1	1	0	0	0	0	0	0	0	(3)
sum	100	100	100	100	100	100	100	100	100	100	100	100	(1905)
groups													
DP	69	66	71	25	36	15	53	48	39	43	61	49	(913)
HD	16	2	12	13	27	9	23	6	20	7	27	23	(297)
ID	7	13	12	53	25	56	11	26	14	20	11	27	(408)
AB	5	16	5	9	10	20	9	21	27	30	-	-	(270)
out	3	2	1	0	1	0	3	0	0	0	1	0	(17)
sum	100	99	101	100	99	100	99	101	100	100	100	99	
(n	154	85	199	121	167	124	159	144	252	248	124	128	1905)

AUS=Sidney, Australia, BUL=Sofia, Bulgaria, KEN=Nairobi, Kenya, MEX=Mexico City
NOR=Norway, USA=Farmington, Conn., USA

M=males
F=females
DP=drinking patients, all levels
HD=heavy drinkers, known "alcoholics"
ID=infrequent drinkers (drank less than three times last year)
AB=abstainers
out=subjects with age not indicated or incomplete data on alcohol consumption

TABLE 2

Alcohol consumption and frequency of intoxication, DP + HD:

		C	SD	F	SD	(n)
AUS	DP	27	43	60	99	(163)
	HD	191	178	207	134	(26)
BUL	DP	30	50	44	89	(172)
	HD	119	198	142	141	(39)
KEN	DP	97	161	98	130	(79)
	HD	237	164	249	115	(56)
MEX	DP	23	58	23	61	(154)
	HD	239	267	183	144	(45)
NOR	DP	10	21	14	49	(206)
	HD	183	134	146	138	(68)
USA	DP	25	63	24	64	(139)
	HD	188	284	210	130	(63)

C = average alcohol consumption typical month, g/day
F = mean frequency of drinking 56 g or more on one occasion, times per year
SD= standard deviation

TABLE 3

Intraclass correlations and correlations with alcohol intake:

	AUS DP			BUL DP			KEN DP			MEX DP			NOR DP			USA DP		
	a	c	f	a	c	f	a	c	f	a	c	f	a	c	f	a	c	f
Subjective complaints (19 items)	.79	.09	.03	.84	.11	.15	.89	.25	.20	.91	.18	.15	.86	.16	.08	.87	.16	.24*
History of trauma (3 items)	.57	.32*	.36*	.58	.09	.11	.21	.20	.10	.59	.47*	.38*	.55	.29*	.28*	.52	.12	.14
Clinical examination (9 items)	.76	.39*	.34*	.44	.20	.14	.70	.18	.18	.70	.24*	.38*	.63	.13	.09	.52	.16	.27*
Negative alcohol reactions (3 items)	.50	.35*	.55*	.74	.32	.24	.70	.62*	.56*	.86	.60*	.82*	.78	.56*	.60*	.72	.53*	.59*
Positive alcohol reactions (2 items)	.74	.15	.28*	.95	.43*	.40*	.91	.44*	.50*	.75	.45*	.56*	.78	.41*	.35*	.59	.35*	.34*
Problems ever (5 items)	.65	.57*	.67*	.41	.51*	.52*	.82	.75*	.74*	.77	.72*	.81*	.60	.62*	.65*	.67	.53*	.58*
Problems last year (14 items)	.68	.62*	.75*	.58	.56*	.50*	.89	.79*	.75*	.90	.75*	.80*	.72	.60*	.70*	.73	.70*	.72*
Dependence syndrome (14 items)	.80	.49*	.78*	.91	.72*	.59*	.97	.80*	.61*	.98	.65*	.80*	.95	.56*	.71*	.89	.70*	.74*

* p<.01 a = Cronbach's alpha c = correlation with alcohol consumption (gamma) f = correlation with frequency of intoxication (gamma)

TABLE 4

Sensitivity (Ss), specificity (Sp) and predictive value of positive results (Pv) of some items, using more than 40 g ethanol per day average consumption as criterium:

No.	Item	AUS DP			BUL DP			KEN DP			MEX DP			NOR DP			USA DP			all DP		
		Ss	Sp	Pv	Ss	Sp	Pv	Ss	Sp	Pv	Ss	Sp	Pv	Ss	Sp	Pv	Ss	Sp	Pv	Ss	Sp	Pv
Alcohol non-specific:																						
17.42	gas/flatulence (>monthly)	56	60	25	26	94	50	61	69	56	47	57	13	42	76	10	68	44	19	69	67	23
17.54	sleep disturbance "	53	58	24	25	80	22	77	58	55	100	55	24	67	77	15	41	65	18	57	67	25
17.55	hand shake, tremor "	25	86	30	19	25	35	42	92	77	90	76	53	50	91	26	32	88	33	39	87	37
17.61	nervousness, anxiety "	41	65	22	38	70	22	55	52	43	95	34	17	67	74	14	77	52	23	57	60	23
21	conjunctival injection	41	82	36	22	91	37	81	35	45	72	88	39	58	86	20	41	44	12	50	77	29
23	coating of tongue	63	62	29	53	60	24	74	46	47	83	73	29	25	83	8	68	58	23	63	67	27
27	scars and bruises	78	42	25	28	66	16	42	73	50	28	94	39	33	94	25	100	9	17	54	66	24
36	syst. blood pressure (>130)	59	52	23	32	59	15	39	65	41	47	66	15	83	43	8	55	54	18	49	55	17
86	GGT (> 50, Norw.stand.)	42	85	41	13	84	15	21	97	86	60	82	27	58	96	47	29	87	29	32	88	34
Alcohol specific:																						
57	skipped meals b.of drinking	59	91	61	22	92	64	52	92	80	90	96	65	58	99	70	36	98	73	50	95	68
60	morning drinking	31	99	83	22	100	100	29	98	90	89	96	77	42	99	83	14	100	100	34	99	85
65	stayed drunk for days	6	100	100	6	100	100	30	100	100	90	99	90	50	99	75	5	100	100	25	99	90
72	more friendly after drinking	47	59	22	69	74	43	71	44	45	94	75	34	67	79	16	68	66	29	67	70	30
74	guilt/remorse after drinking	17	99	83	16	99	71	61	79	66	94	89	53	50	96	43	23	93	39	39	94	56
76a	family suggested cut down	59	81	43	28	91	41	74	81	72	95	78	38	58	87	21	64	79	36	61	83	41
79a	doctor/h.worker concerned	38	94	60	9	99	60	55	94	85	63	91	50	42	97	50	27	92	38	37	95	58

TABLE 5:

Best items (stepwise multiple regression against typical alcohol consumption, cutoff 40g/day):

AUS DP		BUL DP		KEN DP		MEX DP		NOR DP		USA DP		all DP	
Alcohol non-specific items, r(mult):													
GGT	.26	gas/flatulence	.26	hands shake	.43	conj.injection	.45	GGT	.51	tongue coating	.23	hands shake	.23
conj.injection	.33	conj.injection	.31	GGT	.54	sleep disturb.	.53	hands shake	.58	anxiety	.29	conj.injection	.30
scars & bruises	.36	hands shake	.32	gas/flatulence	.56	scars & bruises	.55	conj.injection	.61	scars & bruises	.32	GGT	.34
gas/flatulence	.38	systolic BP	.33	sleep disturb.	.57	hands shake	.57	anxiety	.62	systolic BP	.35	tongue coating	.37
tongue coating	.39	GGT	.34	scars & bruises	.58	GGT	.59	systolic BP	.62	conj.injection	.36	scars & bruises	.38
systolic BP	.40	tongue coating	.34	tongue coating	.59	gas/flatulence	.61	sleep disturb.	.63	GGT	.37	sleep disturb.	.39
Alcohol specific items, r(mult):													
skip meals	.55	more friendly	.43	fam.sugg.cutd.	.54	stay drunk	.87	stay drunk	.61	skip meals	.44	skip meals	.61
morning drink	.59	morning drink	.53	doc. concerned	.62	guilt/remorse	.88	skip meals	.70	more friendly	.50	doctor concerned	.67
doc. concerned	.61	guilt/remorse	.54	guilt remorse	.64	morning drink	.88	more friendly	.70	morning drink	.54	guilt/remorse	.70
stay drunk	.63	fam.sugg.cutd.	.54	stay drunk	.66	doc. concerned	.88	morning drink	.71	fam.sugg.cutd.	.56	fam.sugg.cutd.	.70

The r(mult) correlations show how the total correlation increases by adding the next item(s) to the first (alcohol non-specific and alcohol specific items are analysed separately)

TABLE 6:

Predictive value of positive results of the non-specific and the specific instruments

Drinking patients (DP) only

Criteria:

Typical alcohol consumption above 40 g per day average
Non-specific instrument score 5 or more = pos
Specific instrument score 4 or more = pos

	AUS	BUL	KEN	MEX	NOR	USA	all
Prevalence of drinking > 40 g/day (%)	20	19	39	12	6	16	16
Predictive value of non-specific instrument	46	50	92	54	67	33	56
Predictive value of specific instrument	88	100	95	65	86	60	80

TABLE 7:

Predictive values of positive results with two and four best items for drinking more than 40 grams of ethanol per day.

Criteria:
Two items: 1 or 2 = pos
Four items: 2, 3 or 4 = pos

AUS DP		BUL DP		KEN DP		MEX DP		NOR DP		USA DP	
g+n	49	a+j	37	c+l	70	e+i	89	g+i	50	f+n	40
e+g+h+n	83	a+e+h+j	85	c+g+l+m	86	b+e+k+n	71	c+g+i+n	75	d+f+j+n	42

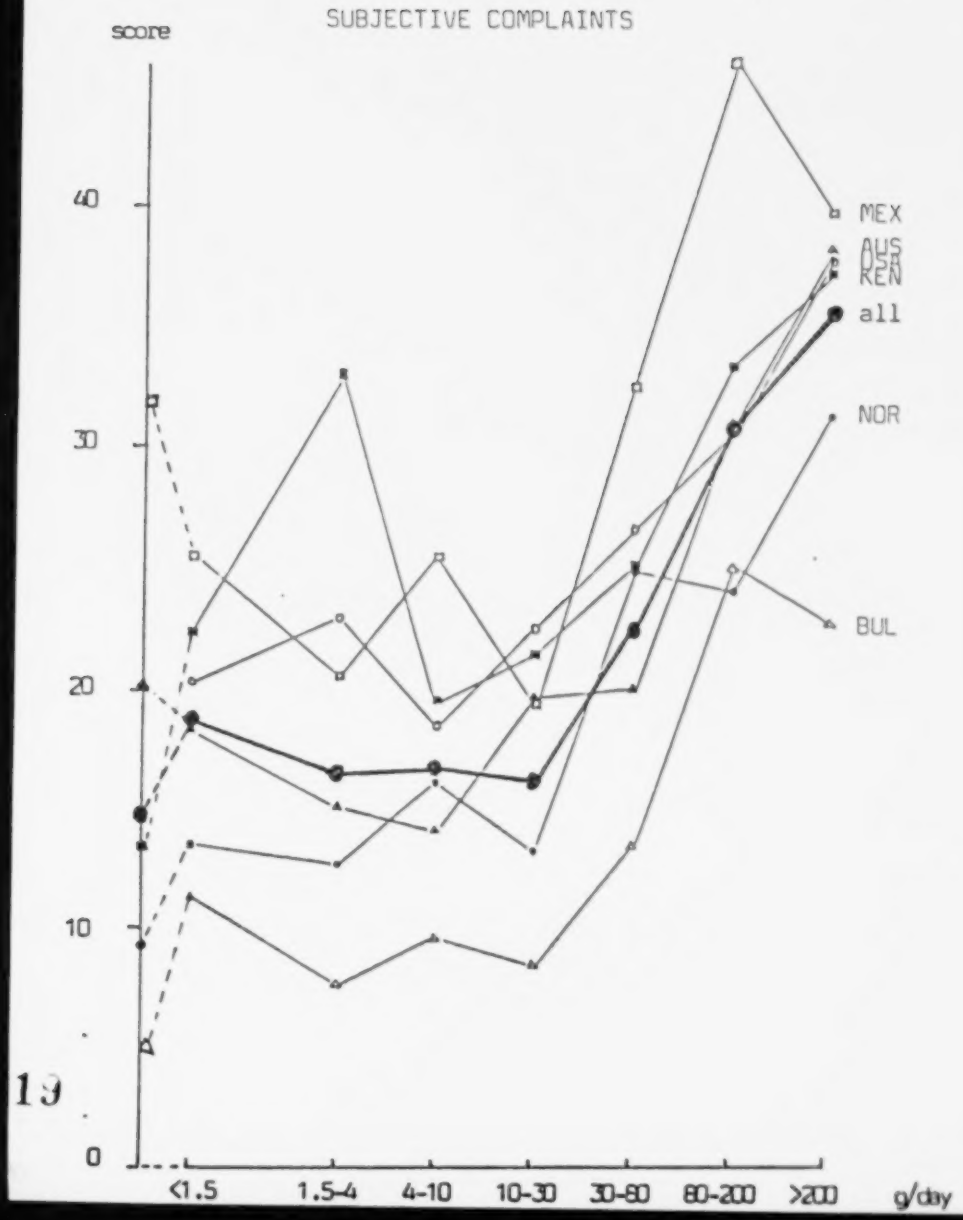
Alcohol non-specific:

a=17.42 gas/flatulence (>monthly)
b=17.54 sleep disturbance (>monthly)
c=17.55 hands shake, tremor (>monthly)
d=17.61 nervousness, anxiety (>monthly)
e=21 conjunctival injection
f=23 coating of tongue
g=86 GGT (>50, Norwegian standard)

Alcohol specific:

h=60 morning drinking
i=65 stayed drunk for days
j=72 more friendly after drinking
k=74 guilt/remorse after drinking
l=76a family suggested cut down
m=79a doctor or health worker concerned
n=57 skipped meals because of drinking

FIG. 1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30
20
10
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MEX
AUS
USA
KEN
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NOR
BUL
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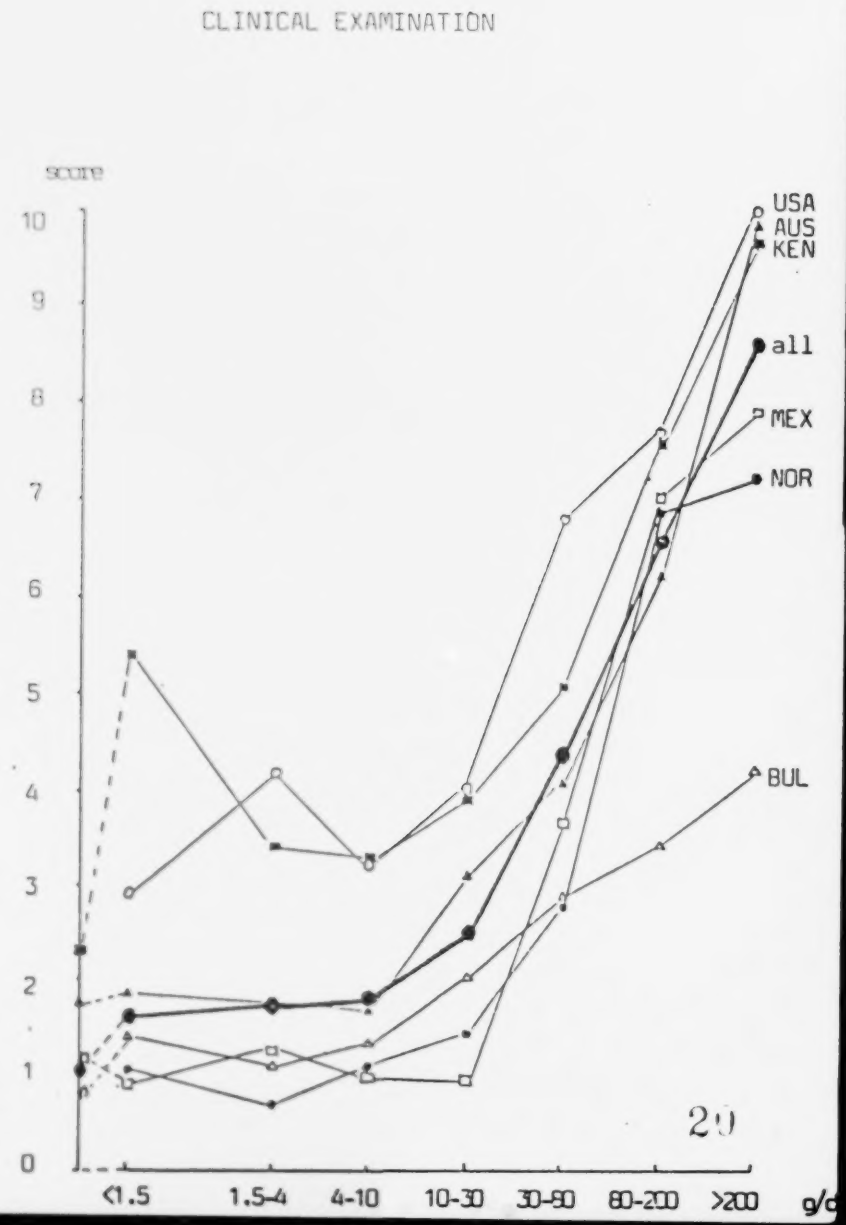
1.5-4
4-10
10-30
30-80
80-200
>200
g/day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6
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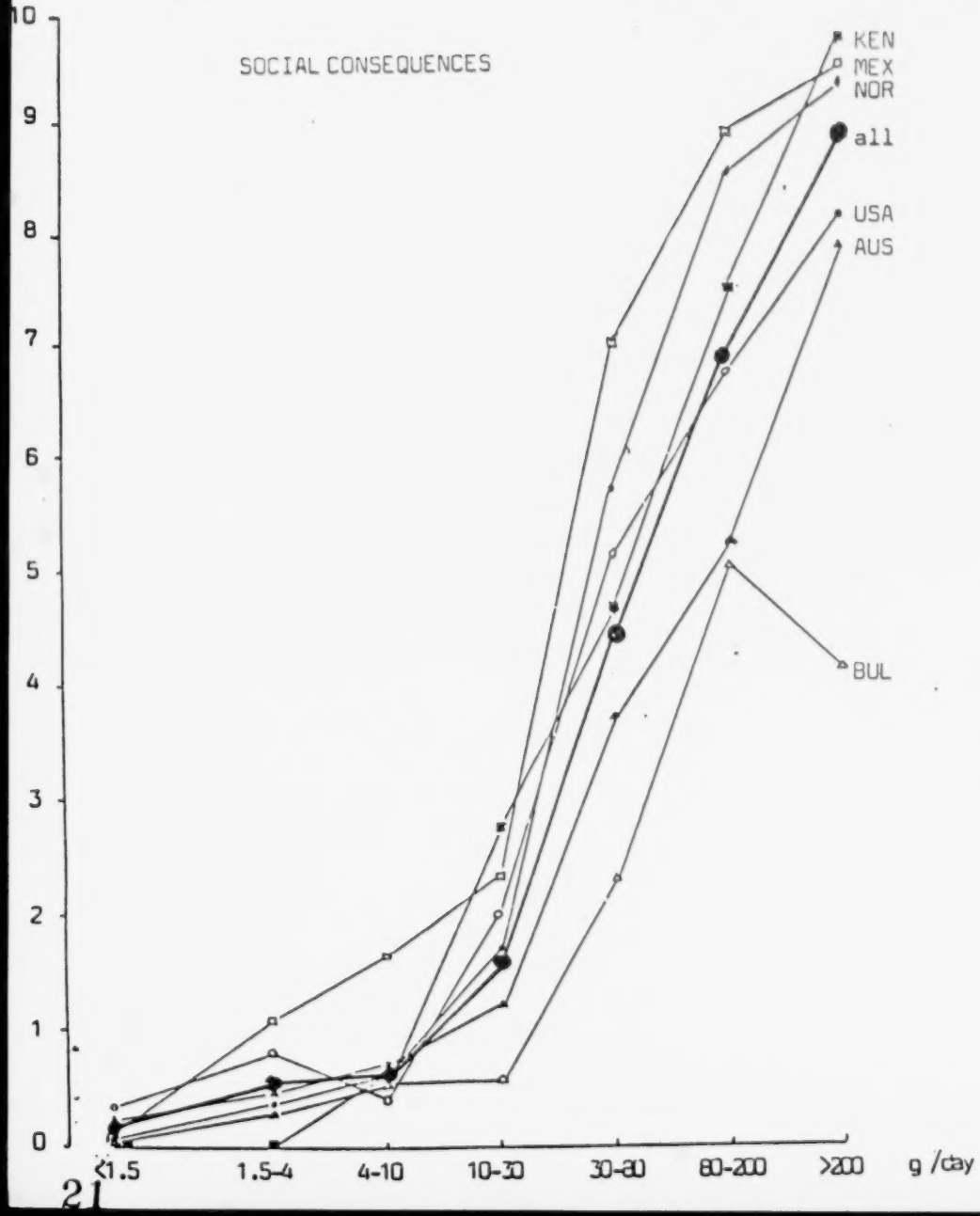
10-30
30-80
80-200
>200

FIG. 1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30-80
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>200
g /day

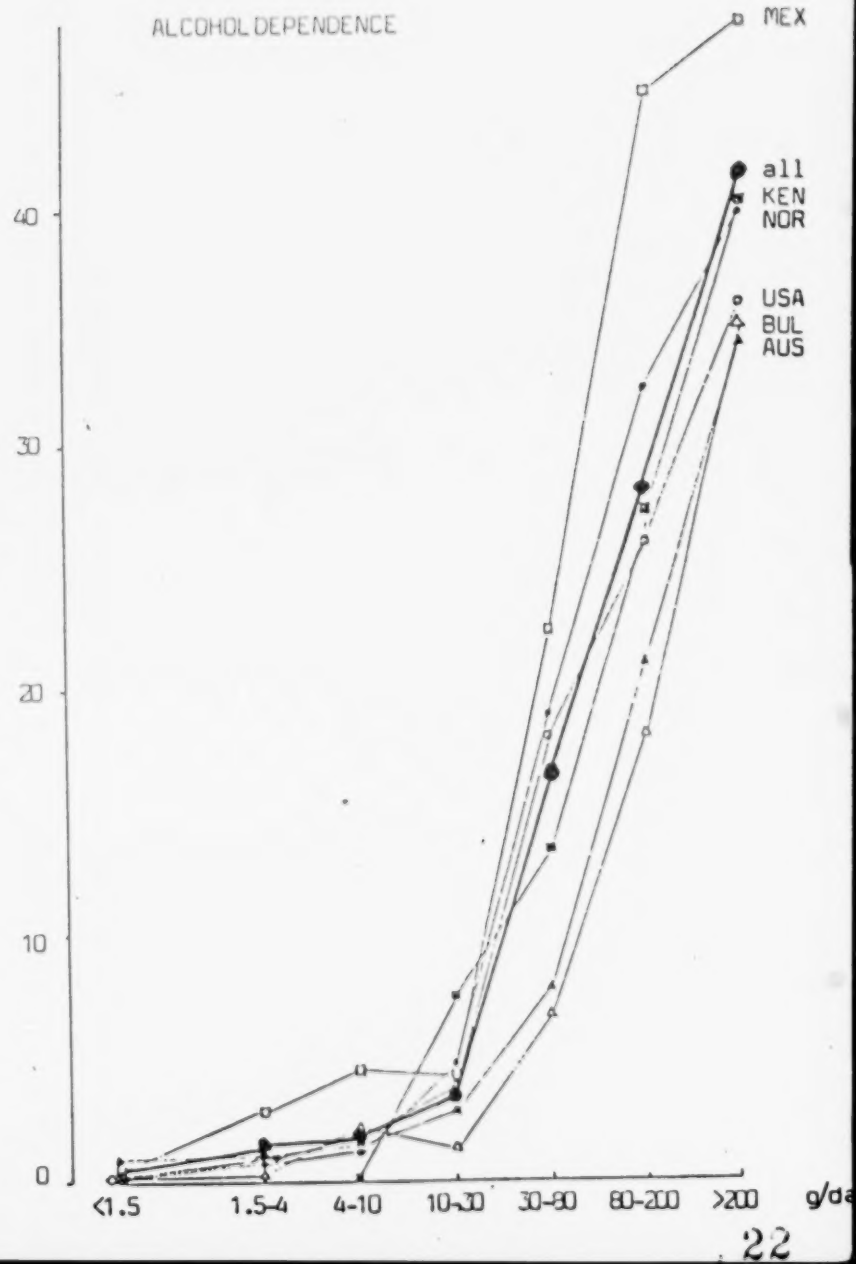
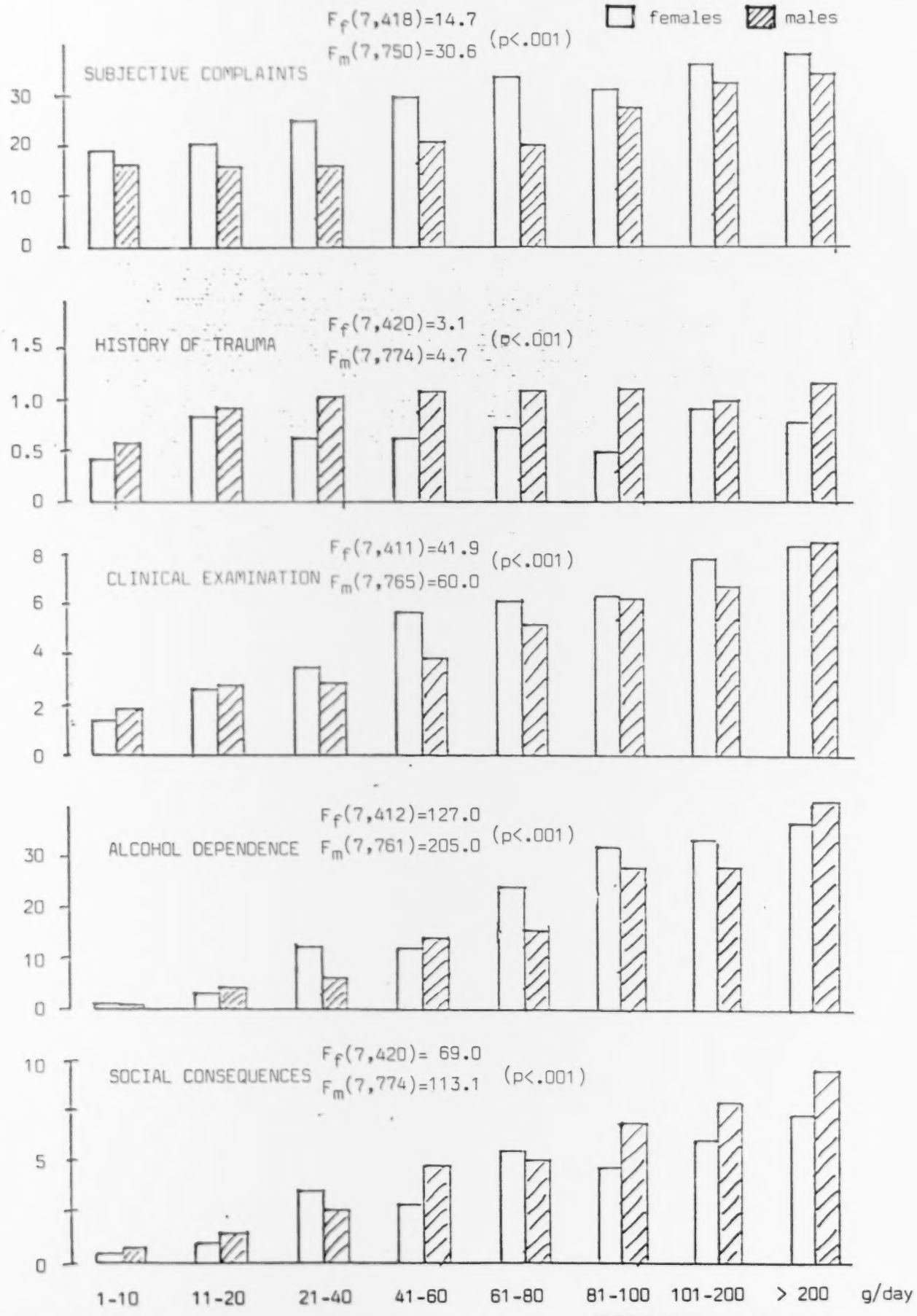

ALCOHOL DEPENDENCE
MEX
all
KEN
NOR
USA
BUL
AUS
0
10
20
30
40
<1.5
1.5-4
4-10
10-30
30-80
80-200
>200
g/da

FIG. 2. Scale scores on different consumption levels, DP+HD grouped, all countries



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